

## Research Article

# Learning to Communicate with CHF Patients Through Practice Experiments — Example and Results

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**Abstract**

The paper shows how the novice medical professional can learn to communicate with patients, using the science of Mind Genomics. The user identifies the topic, creates four questions about the topic, and for each question creates four answers, either with the use of artificial intelligence (LLM, large language model), or without any coaching. The respondents evaluate vignettes, combinations of answers. The analysis reveals which elements (viz., answers, messages) drive the desired response. Applying cluster analysis to the results shows the existence and nature of mind-sets, people who differ in what they believe to be important. The process is rapid, inexpensive, and templated. The outcome is the enhancement of knowledge about what to say to patients regarding a specific issue, with the system adaptable to any issue whose messaging can be systematically explored.

**KEY WORDS:** Congestive heart failure, Large Language Model, Mind Genomics, patient communication

**INTRODUCTION**

Effective communication with patients is crucial for ensuring that they understand their diagnosis, know what will happen in their treatment plan, and are motivated to comply with what they are required to do. By developing their communication skills, medical professionals have the opportunity to cultivate a positive connection with their patients, build trust, and in turn improve the likelihood of a positive outcome through patient satisfaction and compliance. Today's literature on the issues facing the medical profession is replete with articles about the need to be more patient-sensitive, more patient-centric [1-3].

A key issue is how does one become more patient-centric, especially when the person is a young doctor, with little experience. There are courses in medical schools dealing with the patient, and of course the now legendary focus on the bedside manner of physicians — and how important it is — remains [4,5].

In this paper we present a simple approach for the novice, the young doctor, who wants to learn about the words to use with patients. The approach is called Mind Genomics [6,7]. Mind Genomics is an emerging science with roots in psychology and statistics. The objective of Mind Genomics is to understand how people make decisions about the ordinary aspects of their lives. Knowing what people value and will listen to in a discussion helps the marketer sell products [8], and quite importantly, helps substantial reduction in the readmission of physicians [9] patients to the hospital within 30 days of discharge [10].

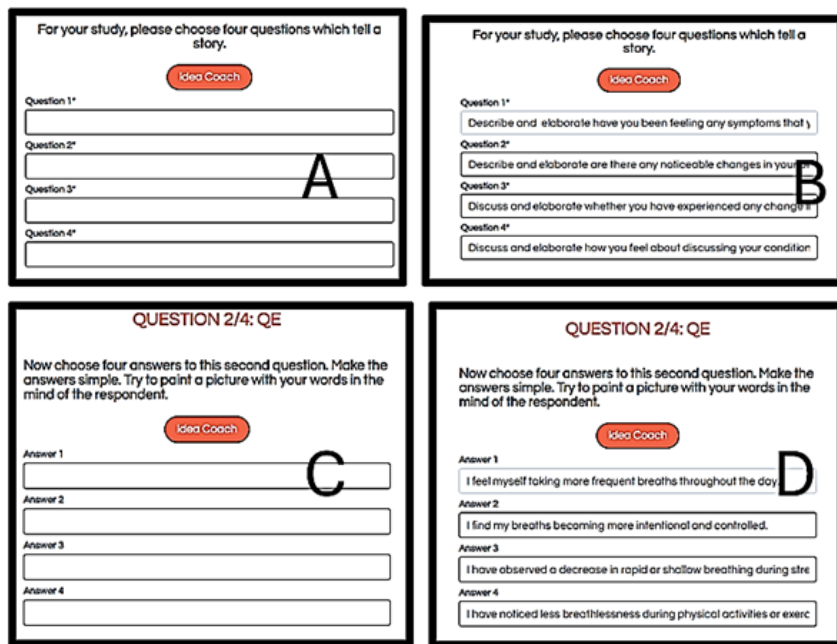
Mind Genomics generates a combination of insights and recommendations to improve communication. As will be shown below, the empirical-based Mind Genomics approach allows the medical professional at any level to test out the response to communications, either with patients or with easier-to-find colleagues. The information quickly reveals the power of each message. Furthermore, the structure of the Mind Genomics experiment is such that it is virtually impossible to “game,” making the tool good for teaching and for immediate application by the student to real-life situations.

**Exploring Ideas Using Mind Genomics**

Mind Genomics operates by presenting participants with combinations of messages, known as vignettes. These vignettes are carefully crafted based on an experimental design that dictates the structure of the combinations [11].

The process begins by identifying the topic, creating four questions, and then four answers for each question. It is the responsibility of the researcher to develop the topic, develop the four questions, and then the four answers to each question. Figure 1 shows the example in four slide shots. The panels on the top show the request for four questions (Panel A) and the four questions provided (Panel B). The panels on the bottom show the request for four answers to question 2 (Panel C) and the four answers provided (Panel D).

Figure 1: The request for questions and answers to the one question



Often, this task is daunting, especially for young researchers who are not accustomed to coming up with questions and answers, or more correctly, are not accustomed to coming up with questions. In that case, the Mind Genomics platform (BimiLeap.com) has an embedded AI in the form of

Idea Coach. Idea Coach links to ChatGPT 3.5 [12]. The user writes a short request, and the AI, ChatGPT 3.5, returns with a set of questions (Table 1, top) and for a specific question, a set of answers (Table 1, bottom).

Table 1: Example of the request for questions (top) and answers to a question (bottom). The request to Idea Coach is in bold.

|  |
|--|
| <p><b>I am a young doctor at a clinic. A group of girls is coming to see me. I think one or several may have heart failure. How do I interact with them to elaborate the interaction? Tell me how to talk to the patient. Tell me how to talk about their feelings.</b></p> <ol style="list-style-type: none"> <li>Can you please describe how you have been feeling lately?</li> <li>Have you noticed any changes in your energy levels or fatigue?</li> <li>Are you experiencing any difficulty breathing, especially during physical activity?</li> <li>Have you experienced any sudden weight gain or swelling in your legs or ankles?</li> <li>Have you noticed any persistent cough or wheezing?</li> <li>Are you able to lie flat comfortably or do you need extra pillows to prop yourself up while sleeping?</li> <li>Are you experiencing any chest discomfort or pain?</li> <li>Have you been experiencing any irregular heartbeats or palpitations?</li> <li>Have you noticed any decreased appetite or nausea?</li> <li>Do you feel more easily exhausted or experience a rapid heart rate during exercise?</li> <li>Have there been any instances of sudden dizziness or fainting episodes?</li> <li>Are you experiencing increased urination, especially at night?</li> <li>Do you feel more anxious or worried than usual?</li> <li>Has there been any history of heart problems or heart disease in your immediate family?</li> <li>Have you had any previous diagnoses of heart-related conditions or received any treatment in the past?</li> </ol> <p><b>Describe and elaborate regarding any noticeable changes in your breathing patterns.</b></p> <ol style="list-style-type: none"> <li>Yes, I have observed deeper inhalations and exhalations during exercise.</li> <li>I tend to breathe faster and more shallowly when I am anxious or stressed.</li> <li>After practicing deep breathing exercises, I noticed a more rhythmic and relaxed breathing pattern.</li> <li>During moments of intense concentration, my breathing becomes slower and more controlled.</li> <li>When I am sick or have a respiratory infection, my breathing becomes more labored and congested.</li> <li>After engaging in meditation or relaxation techniques, my breath feels more balanced and tranquil.</li> <li>Sometimes I notice that I hold my breath unknowingly, especially in tense moments.</li> <li>During moments of physical exertion, my breath becomes rapid and I may occasionally feel short of breath.</li> <li>In high-altitude areas, I experience faster and deeper breathing due to the reduced oxygen levels.</li> <li>When I am sleep-deprived or fatigued, my breathing tends to be shallower and less energized.</li> <li>During periods of deep sadness or grief, my breathing can become irregular and accompanied by sighs.</li> <li>Anxiety or panic attacks may cause me to hyperventilate, resulting in rapid, shallow breathing.</li> <li>When practicing certain poses and stretches in yoga, I noticed a greater awareness and control over my breath.</li> <li>Allergies or asthma can lead to wheezing or difficulty in breathing deeply.</li> <li>Sometimes I catch myself taking long sighs or yawning repeatedly, perhaps indicating tiredness or boredom.</li> </ol> |
|--|

At the end of the exercise, the Mind Genomics researcher will have created a set of four questions, and for each question a set of four relevant answers.

Table 2 shows the final selection created with the aid of the Idea Coach link to the underlying AI provided by ChatGPT 3.5.

**Table 2: The final selection of four questions and four answers to each question.**

|    |  |
|----|--|
|    | <b>Question A: Describe and elaborate — have you been feeling any symptoms that you think are worrisome?</b>     |
| A1 | I've been feeling tired and fatigued even after getting enough sleep.  |
| A2 | I've been having difficulty breathing and experiencing shortness of breath.                                      |
| A3 | I have been experiencing abdominal pain, and it's worrying me.   |
| A4 | I've been having trouble falling asleep and staying asleep.  |
|    | <b>Question B: Describe and elaborate — are there any noticeable changes in your breathing patterns?</b>         |
| B1 | I feel myself taking more frequent breaths throughout the day.   |
| B2 | I find my breaths becoming more intentional and controlled.  |
| B3 | I have observed a decrease in rapid or shallow breathing during stressful situations.                            |
| B4 | I have noticed less breathlessness during physical activities or exercises.                                      |
|    | <b>Question C: Discuss and elaborate whether you have experienced any change in your energy levels recently.</b> |
| C1 | My energy levels have been fluctuating throughout the day, with periods of high and low energy.                  |
| C2 | I have been incorporating regular exercise into my routine, which has resulted in higher energy levels overall.  |
| C3 | Due to increased stress and lack of sleep, my energy levels have been noticeably lower.                          |
| C4 | My energy levels have been impacted by changes in my medication.   |
|    | <b>Question D: Discuss and elaborate how you feel about discussing your condition with your family members.</b>  |
| D1 | I feel comfortable discussing my condition with my family members as they are understanding and non-judgmental.  |
| D2 | Discussing my condition with family members is important to me because they are my closest support system.       |
| D3 | Sharing my condition with family members helps me feel less alone and isolated in my struggles.                  |
| D4 | I value their input and advice when it comes to managing my condition effectively.                               |

Shortly after selecting the questions and answers (questions and elements in the language of Mind Genomics) the user creates a simple questionnaire to measure how the respondent feels when reading the test combination (vignette). The respondent will end up reading systematically created combinations of these elements (discussed below), and then rating each combination of elements on the five-point scale shown in Table 3. Figure 2 shows the screenshot of the scale as set up by the user. The entire process is “templated.”

The scale has two sides. The left side is devoted to how the patient will feel. The right side is devoted to how the doctor will feel. There are two options. The patient will not feel relieved, or the patient will feel relieved. There are also two other options. The doctor will not feel informed, or the doctor will feel informed. The two options combine into four scale points. The fifth scale point, in the middle, is devoted to the response “I cannot answer.”

**Table 3: The rating scale to be used by the respondent when evaluating each of the combinations of elements.**

|   |
|---|
| <b>Please read the description below of a patient talking to a doctor and tell us what you think.</b> |
| 1 = Patient will not feel relieved saying this AND Doctor will not feel informed.                     |
| 2 = Patient will not feel relieved saying this BUT Doctor will feel informed.                         |
| 3 = I cannot answer.  |
| 4 = Patient will feel relieved saying this BUT Doctor will not feel informed.                         |
| 5 = Patient will feel relieved saying this AND Doctor will feel informed.                             |

Figure 2: Screenshot of the Mind Genomics template (BimiLeap.com) showing how the user sets up the rating scale.

**RATING SCALE**

Please type the question that you would like your respondents to answer.

Please tell us what you think

The lowest value is 1, choose the highest scale value:

You must fill in #1 and #5. You have an option of defining the numbers in between but it's not required.

What does 1 mean on the scale?

What does 2 mean on the scale?

What does 3 mean on the scale?

What does 4 mean on the scale?

What does 5 mean on the scale?

The test stimuli evaluated by the respondents are known as “vignettes,” as noted above. The vignettes are short, easy-to-read combinations of elements, one element per line (see Figure 3). There are no connectives in the vignette. Each element (viz., answer to a question) is a stand-alone thought. The objective is to present the respondent with a jumble of thoughts, almost like William James’ description of the visual world of a newborn baby, a “blooming, buzzing confusion.” To the respondent, the vignette seems to be a hodge-podge of ideas, with no underlying structure, something that must be simply rated without much attention, without much motivation, and indeed in the way that most of daily life is evaluated. The outcome, however, is a deep, profound understanding of the mind of the seemingly disinterested, bored respondent, due to the way the vignettes are constructed.

1. A respondent evaluated exactly 24 vignettes.
2. The vignettes for each respondent comprised a minimum of two elements and a maximum of four.
3. At most one answer (aka “element”) from an element (aka “category”) was present in any vignette. This strategy is a form of bookkeeping to ensure that no vignette could present different and mutually contradictory information of the same type.
4. Each element appeared five times in 24 vignettes and was absent 19 times from the 24 vignettes.
5. Each question or category thus contributed to 20 of the 24 vignettes.
6. Every respondent evaluated different vignettes. This approach is unique to Mind Genomics and ensures that Mind Genomics studies cover a great deal of the possible combinations. By testing different sets of combinations, the Mind Genomics studies do not require a great deal of thinking to identify the “most promising” elements.
7. Each respondent evaluated a precisely created set of 24 vignettes, with all 16 elements statistically independent of each other, and prepared for analysis, specifically OLS (ordinary least squares) regression analysis (also called curve fitting).

Figure 3: Example of a vignette as the respondent would see it. The respondent’s sole job is to read the vignette and rate it on the scale.

Please read the description below of a patient talking to a doctor.

Please tell us what you think

1 = Patient will not feel relieved saying this AND Doctor will not feel informed.  
 2 = Patient will not feel relived saying this BUT Doctor will feel informed.  
 3 = I cant answer  
 4 = Patient will feel relieved saying this but Doctor will not feel informed.  
 5 = Patient will feel relieved saying this AND Doctor will feel informed.

I've been having difficulty breathing and experiencing shortness of breath.

I have observed a decrease in rapid or shallow breathing during stressful situations.

I have been incorporating regular exercise into my routine, which has resulted in higher energy levels overall.

I value their input and advice when it comes to managing my condition effectively.

1 2 3 4 5

## Preparing the Data for Regression

To prepare the data for analysis by regression required that we deconstruct the two-sided scale into two unidirectional scales. This was done through the following transformation:

- R54 (Relieves the patient) takes on the value of 100 when the original rating was either 5 or 4. Otherwise, R54 takes on the value of 0.
- R52 (Doctor feels informed) takes on the value of 100 when the original rating was 5 or 2. Otherwise R52 takes on the value of 0.

Afterwards, a random number ( $<10^{-5}$ ) was added to the newly transformed binary variables, R54 and R52. The random number is simply to ensure that there is a minimal level of variability in each newly created value. That random variability will not affect the results in any material way but will ensure that all observations in the data set (viz., the 24x51 or 1,224 observations) have a range of variation for R54 and R52, respectively. In that way, the regression analysis to be done on the data will complete, and not “crash.”

The actual regression for R54, the key dependent variable, was done twice, first for the total panel, and then for each of the 51 respondents. The individual-level regressions for R54 were done to create a database of coefficients for the 51 respondents, to be used later in clustering the respondents into two and then into three mind-sets. The actual regression for R52 was done only once, for the total panel.

**Table 4: Performance of the total panel of 51 respondents for R5 (patient relieved, doctor informed), for R54 (patient relieved), and for R52 (doctor informed). The strong performing element is shown in a shaded cell.**

|    | Patient Relieved  | Y  | Y   |     |
|----|---|----|-----|-----|
|    | Doctor Informed   | Y  |     | Y   |
|    | Name of Dependent Variable  | R5 | R54 | R52 |
| B4 | I have noticed less breathlessness during physical activities or exercises.                                     | 16 | 17  | 22  |
| B3 | I have observed a decrease in rapid or shallow breathing during stressful situations.                           | 15 | 16  | 20  |
| A1 | I've been feeling tired and fatigued even after getting enough sleep.   | 14 | 22  | 21  |
| A3 | I have been experiencing abdominal pain, and it's worrying me.  | 10 | 19  | 15  |
| A2 | I've been having difficulty breathing and experiencing shortness of breath.                                     | 9  | 17  | 14  |
| A4 | I've been having trouble falling asleep and staying asleep.   | 9  | 22  | 11  |
| B2 | I find my breaths becoming more intentional and controlled.   | 9  | 13  | 15  |
| C4 | My energy levels have been impacted by changes in my medication.  | 9  | 12  | 15  |
| B1 | I feel myself taking more frequent breaths throughout the day.  | 7  | 13  | 16  |
| C3 | Due to increased stress and lack of sleep, my energy levels have been noticeably lower.                         | 6  | 14  | 16  |
| D1 | I feel comfortable discussing my condition with my family members as they are understanding and non-judgmental. | 6  | 13  | 12  |
| C1 | My energy levels have been fluctuating throughout the day, with periods of high and low energy.                 | 5  | 14  | 13  |
| D2 | Discussing my condition with family members is important to me because they are my closest support system.      | 5  | 11  | 10  |
| D3 | Sharing my condition with family members helps me feel less alone and isolated in my struggles.                 | 5  | 9   | 8   |
| D4 | I value their input and advice when it comes to managing my condition effectively.                              | 4  | 9   | 12  |
| C2 | I have been incorporating regular exercise into my routine, which has resulted in higher energy levels overall. | 3  | 10  | 8   |

## Deeper Analysis of the Results by AI

LLMs (large language models), like ChatGPT 3.5, possess the ability to condense information into a coherent and simplified form, enhancing the understandability and interpretability of intricate data. They can also analyze the data to offer valuable insights for decision-making and future planning, projecting potential outcomes or trends. With the help of these sophisticated language models, the analysis process becomes more streamlined and thorough, allowing for a deeper comprehension of the

The Mind Genomics process generates a simple equation, now written without the additive constant:

$$\bullet \quad R5 \text{ or } R54 \text{ or } R52 = k_1(A1) + k_2(A2) \dots k_{16}(D4)$$

By creating an equation without an additive constant, all of the explanatory power resides in the value of the coefficient, making it easier to understand the result. The underlying “story in the data” emerges more easily, simply by comparing the coefficients. Furthermore, the coefficients have meaning, and have ratio properties, so a coefficient of 6 means twice as much “pulling” or “influencing” power as a coefficient of 3.

Statistical analyses suggest that coefficients of 21 or higher are statistically significant. Furthermore, their strength is both in statistical terms and in the meaning they add to the results. For this paper, we will consider only coefficients of 21 or higher when we look at what story the data are trying to tell.

Table 4 shows the coefficients for the total panel for R5, R54, and R52. There is only one strong performing element, A4 (I have been having trouble falling asleep and staying asleep), an element which does not inform the doctor. This lack of strong performing elements should not distress us. It is typical for Mind Genomics studies to generate relatively low coefficients for total panel, but higher coefficients and more interpretable patterns when we cluster the respondents, as will be seen in Table 5.

data and its implications.

The set of post-analytic prompts generated by ChatGPT 3.5 can be a valuable learning tool for medical professionals, regardless of their level of experience (see Tables 5 and 6). It offers valuable guidance in interpreting and making sense of the results, providing unique insights and perspectives that may have been overlooked. This can be really helpful for professionals who are diving into a new and unfamiliar topic. It helps to fill in

the gaps in knowledge and expertise, making the learning process easier and more interesting.

The analyses using ChatGPT 3.5, in conjunction with the Mind Genomics platform's regression model and clustering, brings a valuable new dimension to our thinking. It offers insights and interpretations in a conversational and accessible manner, enhancing our understanding. This analysis utilizes AI technology to reveal hidden patterns and trends that may not be immediately obvious from the data alone. By doing so, it enables a more

comprehensive comprehension of the results and their potential implications. It also enables a more engaging and fluid exploration of the data, fostering curiosity and prompting deeper investigation of the findings.

Tables 5 shows the analyses done using the elements whose coefficients are 21 or higher for the model relating the presence/absence of the 16 elements to R54. Table 5 shows the results for the Total Panel, which has relative few strong performing coefficients.

**Table 5: The set of post-analytic prompts and AI-based analysis for the Total Panel and based on the coefficients of R54 (Relieves the patient).**

**Overall — Top**

I've been feeling tired and fatigued even after getting enough sleep.; I've been having trouble falling asleep and staying asleep.

**Create a label:** Sleep-related issues

**Describe these people:** Individuals who are experiencing persistent fatigue and sleep-related difficulties, despite getting an adequate amount of sleep. These individuals often feel tired and fatigued throughout the day, regardless of the amount of rest they receive. Additionally, they have been facing difficulties in both falling asleep and staying asleep. These symptoms may indicate the presence of a sleep disorder or other underlying health issues affecting their sleep quality.

**Describe the attractiveness of this segment as a target audience:** This group, consisting of individuals who have been feeling tired and fatigued even after getting enough sleep and experiencing trouble falling asleep and staying asleep, could be highly attractive as a target audience for specific products or services related to sleep quality and fatigue alleviation.

The fact that these individuals are already getting enough sleep but still feeling tired suggests that they might be struggling with underlying issues affecting their sleep quality. Their desire for better sleep and relief from fatigue makes them likely to actively seek solutions and be receptive to interventions or interventions addressing these problems. As a target audience, they may be more motivated and willing to invest in products or services that can effectively improve their sleep quality and overall well-being.

Additionally, the prevalence of sleep-related issues, such as insomnia or sleep disorders, is on the rise due to various factors like stress, lifestyle demands, and technological advancements. This implies a potentially significant market size for products or services targeting individuals who have trouble falling asleep and staying asleep, creating an opportunity for businesses to meet their needs.

However, it is essential to consider the specific demographic factors and psychographic characteristics of this segment to further assess its attractiveness. Factors such as age, gender, occupation, and lifestyle may play a role in determining the appropriateness of targeting this audience. Conducting more detailed research on this specific segment would provide a more comprehensive understanding of their preferences, motivations, and purchasing behaviors, enabling businesses to tailor their offerings to meet their needs effectively.

**List what is missing or should be known about this group, in question form:**

1. How long has this feeling of tiredness and fatigue been present?
2. Have there been any recent changes in sleep patterns or daily routine that could potentially explain the fatigue?
3. Is there a specific time of day when the fatigue is more pronounced?
4. Are there any underlying medical or psychological conditions that could contribute to the fatigue?
5. Are there any lifestyle factors that could be affecting sleep quality, such as caffeine consumption, use of electronic devices before bed, or irregular sleep schedules?
6. Have there been any recent stressful events or disruptions in personal life that could impact sleep patterns?
7. Have any attempts been made to address the fatigue, such as changes in diet, exercise, or relaxation techniques?
8. Are there any other symptoms accompanying the tiredness and fatigue that might provide additional insights?
9. Has a healthcare professional been consulted regarding these sleep difficulties and fatigue?
10. Are there any medications or substances being taken that could potentially affect sleep quality?

**Attractive new or innovative products, services, experiences, or policies for this segment:**

1. Sleep aid technology: Developing new products or gadgets that help individuals fall asleep and stay asleep, such as smart pillows with built-in sleep tracking and relaxation features or advanced sleep sound machines.
2. Sleep coaching services: Offering personalized sleep coaching services that provide guidance on improving sleep habits and routines, implementing relaxation techniques, and managing stress, thereby helping individuals overcome fatigue and sleep difficulties.
3. Natural sleep remedies: Introducing innovative natural sleep remedies like herbal supplements, aromatherapy products, or sleep-inducing teas that promote relaxation and better sleep quality.
4. Work flexibility policies: Implementing flexible work policies to help individuals manage their energy levels and reduce fatigue, such as compressed workweeks, remote work options, or flexible scheduling, enabling better rest and recovery.
5. Sleep-focused wellness retreats: Creating specialized retreats or wellness programs that focus on improving sleep and managing fatigue through activities like yoga, mindfulness training, sleep education, and relaxation therapies.
6. Sleep hygiene apps: Developing smartphone applications that provide personalized recommendations for improving sleep hygiene, including reminders to limit screen time before bed, sleep-friendly ambient noise or light, and relaxation exercises.
7. Sleep-friendly beddings: Creating innovative bedding products that optimize comfort and promote better sleep, such as temperature-regulating bed sheets, pressure-relieving mattresses, or smart alarm clocks that wake individuals up during their lightest sleep phase.
8. Workplace nap spaces: Designing dedicated areas in workplaces where individuals can take power naps during breaks. These spaces could be equipped with comfortable recliners, dimmed lighting, and calming music or nature sounds.

9. Energy management workshops: Conducting workshops or training programs that educate individuals about energy management techniques, including stress reduction, time management, and prioritization strategies, to prevent or overcome fatigue.
10. Sleep-focused wellness subscriptions: Offering subscription-based services that provide a curated selection of sleep-enhancing products, such as relaxation tools, sleep aids, and self-care items, delivered to customers regularly to support their overall well-being and quality of sleep.

## Mind-Sets

To create mind-sets, the Mind Genomics platform first estimates the equation for each individual respondent. The next step entails grouping individuals with similar patterns of coefficients into “mind-sets.” This is done by “k-means clustering,” which assigns each respondent to one of two and then one of three clusters, based upon similar patterns of the 16 coefficients [13]. In this study, the three-cluster solution was not easy to understand and was discarded, leaving only the two cluster solution, which was

far easier to understand. These clusters then become our “mind-sets” (see Table 6).

The mind-sets themselves are created via strictly mathematical criteria, but the researchers must interpret the results to understand the different patterns of thinking among study participants. To do so, the strong performing elements (with coefficients 21+) for each group are shown in shaded cells. Coefficients of +1 or lower are shown as a blank cell. The table is sorted by the strong elements of the two emergent mind-sets.

**Table 6: Performance of 16 elements for the two mind-sets (clusters). The elements are sorted in descending order by Mind-Set 1. The strong performing elements are shown in shaded cells.**

|    | Group (Binary Ratings)  | Mind-Set 1 of 2 | Mind-Set 2 of 2 |
|----|---|-----------------|-----------------|
|    | <b>Base Size</b>  | 26              | 25              |
|    | <b>Mind-Set 1 (Breathing problems)</b>  |                 |                 |
| B4 | I have noticed less breathlessness during physical activities or exercises.                                     | 30              | 3               |
| A1 | I've been feeling tired and fatigued even after getting enough sleep.   | 25              | 19              |
| B2 | I find my breaths becoming more intentional and controlled.   | 24              |                 |
| B3 | I have observed a decrease in rapid or shallow breathing during stressful situations.                           | 24              | 7               |
| B1 | I feel myself taking more frequent breaths throughout the day.  | 23              | 2               |
|    | <b>Mind-Set 2 (Sleep, pain, and energy problems)</b>  |                 |                 |
| A4 | I've been having trouble falling asleep and staying asleep.   | 19              | 26              |
| A3 | I have been experiencing abdominal pain, and it's worrying me.  | 17              | 22              |
| A2 | I've been having difficulty breathing and experiencing shortness of breath.                                     | 12              | 22              |
| C3 | Due to increased stress and lack of sleep, my energy levels have been noticeably lower.                         | 9               | 21              |
| C1 | My energy levels have been fluctuating throughout the day, with periods of high and low energy.                 | 7               | 21              |
|    | <b>No Extremely High Impact Elements</b>  |                 |                 |
| C4 | My energy levels have been impacted by changes in my medication.  | 4               | 20              |
| C2 | I have been incorporating regular exercise into my routine, which has resulted in higher energy levels overall. | 2               | 19              |
| D1 | I feel comfortable discussing my condition with my family members as they are understanding and non-judgmental. | 13              | 13              |
| D4 | I value their input and advice when it comes to managing my condition effectively.                              | 5               | 13              |
| D2 | Discussing my condition with family members is important to me because they are my closest support system.      | 12              | 11              |
| D3 | Sharing my condition with family members helps me feel less alone and isolated in my struggles.                 | 12              | 7               |

Following the same analytic strategy as done for the total panel, we see the supplementary AI analyses of the strong performing elements for the two mind-sets, now in Table 7.

**Table 7: The set of post-analytic prompts and AI-based analysis for the Mind-Set 1 and 2, based on the coefficients of R54 (Relieves the patient).**

**MIND-SET 1 OF 2**

**Description:** I've been feeling tired and fatigued even after getting enough sleep.; I feel myself taking more frequent breaths throughout the day.; I find my breaths becoming more intentional and controlled.; I have observed a decrease in rapid or shallow breathing during stressful situations.; I have noticed less breathlessness during physical activities or exercises.

**Create a label:** Improved Breathing and Reduced Fatigue

**Describe these people:** This segment consists of individuals who have been experiencing symptoms of tiredness and fatigue despite getting adequate sleep. These individuals also report taking more frequent breaths throughout the day, with a noticeable increase in intentional and controlled breathing. Furthermore, they mention observing a decrease in rapid or shallow breathing during stressful situations and less breathlessness during physical activities or exercises.

**Describe the attractiveness of this mind-set as a target audience:** The segment of individuals described in the attributes appears to be experiencing symptoms related to fatigue and breathlessness. They have expressed a desire to improve their overall well-being, particularly in terms of their sleep quality and breath control.

Considering these attributes, this segment could be considered an attractive target audience for products or services related to stress management, relaxation techniques, and breathing exercises. This group would likely be interested in solutions that help them regain control over their breath, reduce fatigue, and improve their physical performance during exercise. They may also be open to exploring different approaches to managing stress and improving sleep quality.

**List what is missing or should be known about this mind-set, in question form:**

1. What is the demographic profile of the individuals in the sample?
2. How many hours of sleep are considered "enough sleep"?
3. Has the duration of feeling tired and fatigued been consistent or has it changed over time?
4. How frequently do individuals experience this feeling of fatigue?
5. Are there any specific activities or factors that contribute to feeling tired and fatigued even after sufficient sleep?
6. Are individuals experiencing any other symptoms in addition to feeling tired and fatigued?
7. Are there any underlying medical conditions or factors that could potentially contribute to this feeling of fatigue?
8. Are individuals on any medications or treatments that could impact sleep quality or fatigue levels?
9. How long has the increased frequency of breaths throughout the day been observed?
10. Are individuals experiencing any difficulties or discomfort associated with the increased intentional and controlled breaths?
11. Are there any specific triggers or factors that lead to this more intentional and controlled breathing?
12. How significant is the decrease in rapid or shallow breathing during stressful situations?
13. Are individuals using any techniques or strategies to control their breathing during stressful situations?
14. What types of physical activities or exercises are individuals engaging in, and how frequently?
15. Are individuals experiencing any breathlessness during specific physical activities or exercises, or is it a general observation?
16. Are individuals experiencing any other changes in physical functioning or performance during physical activities or exercises?
17. Have individuals done anything differently or adopted any strategies to reduce breathlessness during physical activities or exercises?

**Attractive new or innovative products, services, experiences, or policies for this mind-set:**

1. **Breath-tracking wearable device:** A wearable device that tracks and monitors an individual's breathing patterns throughout the day. It provides real-time feedback, helping users become more mindful of their breath and potentially identifying patterns that contribute to fatigue and breathlessness.
2. **Breathing exercise apps:** Mobile applications that offer a variety of breathing exercises and techniques tailored to combat fatigue and promote relaxation. These apps can provide personalized breathing exercises based on the individual's needs, helping them feel more energized and rejuvenated.
3. **Breathing-focused meditation programs:** Meditation programs specifically designed to enhance breath control and relaxation. These programs can teach individuals techniques to control their breath consciously and reduce stress, leading to increased energy levels and decreased fatigue.
4. **Workplace wellness initiatives:** Companies can incorporate wellness programs that emphasize the importance of breathing exercises and stress reduction techniques. By promoting a healthy work-life balance and encouraging employees to prioritize self-care, these initiatives can help reduce fatigue and increase overall well-being.
5. **Sleep improvement solutions:** Products or services that focus on improving the quality of sleep can be beneficial for individuals experiencing fatigue and exhaustion. These could include smart mattresses, sleep tracking apps, or relaxation sound machines, all aimed at creating a more restful and rejuvenating sleep environment.



6. Breathing workshops or retreats: Organizing workshops or retreats that teach participants about the importance of breathing techniques in maintaining overall well-being. These events can educate individuals on mindful breathing and provide them with practical tools to incorporate into their daily lives.
7. Workplace ergonomics assessment: Employers can offer ergonomic assessments to ensure that workstations are properly set up to promote healthy breathing and posture. This can help reduce fatigue and support overall well-being in the workplace.
8. Health insurance coverage for mental health services: Expanding health insurance coverage to include mental health services, such as counseling or therapy sessions, can support individuals who are experiencing fatigue and other related symptoms due to stress or anxiety.
9. Breathing exercise classes: Fitness centers or wellness studios can offer breathing exercise classes, similar to yoga or meditation classes. These classes can provide structured guidance for individuals to improve breath control, reduce fatigue, and increase overall vitality.
10. Breath-focused wellness retreats or spas: Creating retreats or wellness centers that specialize in breath-focused therapies and treatments. These spaces allow individuals to escape from their busy lives and fully immerse themselves in programs aimed at reducing fatigue, improving breath control, and restoring energy levels.

**Which messages will interest this mind-set?**

1. “Boost your energy levels and say goodbye to fatigue!”
2. “Discover the benefits of mindful breathing for a more balanced life.”
3. “Take control of your breath and experience the power of intentional breathing.”
4. “Reduce stress and anxiety with controlled breathing techniques.”
5. “Improve your physical performance by optimizing your breathing patterns.”

**MIND-SET 2 OF 2**

**Description:** I've been having difficulty breathing and experiencing shortness of breath.; I have been experiencing abdominal pain, and it's worrying me.; I've been having trouble falling asleep and staying asleep.; My energy levels have been fluctuating throughout the day, with periods of high and low energy.; Due to increased stress and lack of sleep, my energy levels have been noticeably lower.

**Create a label:** Physical Symptoms and Sleep Disturbances in Relation to Stress

**Describe these people:** This mind-set of the research study consists of individuals who have reported various physical and mental health concerns. Some of the symptoms reported include difficulty breathing and shortness of breath. Additionally, participants have mentioned experiencing abdominal pain, which is causing worry. Sleep issues are also prevalent in this mind-set, with individuals reporting trouble falling asleep and staying asleep. Another common attribute among this group is fluctuating energy levels throughout the day, experiencing both highs and lows. It is worth noting that increased stress and lack of sleep have contributed to noticeably lower energy levels in this mind-set.

**Describe the attractiveness of this mind-set as a target audience:** Based on the provided attributes, this mind-set can be described as individuals who are experiencing physical and psychological discomfort. They are likely to be concerned about their health, specifically their respiratory system, abdominal well-being, and energy levels. They may be seeking solutions to alleviate their breathing difficulties, abdominal pain, sleep problems, and energy fluctuations.

In terms of target audience attractiveness, this mind-set can be considered highly attractive for products or services related to healthcare, sleep aids, stress management, and energy-boosting solutions. They are actively looking for ways to address their health issues and improve their overall well-being. With their specific concerns and needs, this mind-set presents a potential market for healthcare providers, pharmaceutical companies, and organizations offering relaxation techniques, healthy lifestyle choices, or natural remedies.

**Explain why this mind-set might not be attractive as a target audience:** This mind-set might not be attractive as a target audience because its members seem to be experiencing a wide range of health issues and concerns. This could imply a lack of homogeneity within the group, making it difficult for marketers or researchers to develop a focused and targeted approach. Additionally, the mentioned health issues (such as difficulty breathing, abdominal pain, trouble sleeping, and fluctuating energy levels) are relatively common and non-specific symptoms that could be indicative of various underlying medical conditions. Therefore, it may be challenging to tailor specific products, solutions, or messages to this diverse group with different needs and concerns. It would be more efficient and effective to target specific subsets of this population based on the specific issue they are facing.

**List what is missing or should be known about this mind-set, in question form:**

1. Have you noticed any specific triggers or patterns that worsen your difficulty breathing and shortness of breath?
2. How long have you been experiencing abdominal pain and have you noticed any other symptoms associated with it?
3. Have you identified any potential factors that may be causing your trouble falling asleep and staying asleep?
4. What are the durations and frequencies of your periods of high energy and low energy throughout the day?
5. Can you provide more information about the stressors that have been contributing to your increased stress levels?

6. How long have you been experiencing lower energy levels and have you noticed any other symptoms accompanying it?

**Attractive new or innovative products, services, experiences, or policies for this mind-set:**

1. Breathing-assistance device/app: A portable device/app that helps individuals experiencing difficulty in breathing by providing real-time monitoring and personalized breathing exercises to improve lung function and manage symptoms.
2. Telemedicine for abdominal pain: A telemedicine service that allows individuals with abdominal pain to consult with healthcare professionals remotely, offering guidance, assessment, and potential treatment options, minimizing the need for in-person visits.
3. Sleep improvement program: An innovative sleep improvement program that combines various techniques like cognitive behavioral therapy, relaxation techniques, and sleep hygiene education to address sleep issues and help individuals achieve restful and uninterrupted sleep.
4. Energy management app: A smartphone app that tracks energy levels throughout the day and provides personalized suggestions and reminders for lifestyle modifications, exercise routines, and relaxation techniques to optimize energy levels and maintain consistent productivity.
5. Stress-reducing policies at workplaces: Companies implementing policies that prioritize employee mental health and well-being, such as flexible work schedules, stress management programs, and designated break areas, to reduce stress levels and promote better overall energy and productivity.

**Which messages will interest this mind-set?**

1. Are you experiencing difficulty breathing or shortness of breath? Our research study may have answers for you.”
2. “Are you worried about persistent abdominal pain? Participate in our research study to find out more.”
3. “Trouble falling asleep or staying asleep? We’re conducting a study that could provide insights and potential solutions.”
4. “Do your energy levels fluctuate and vary throughout the day? Join our research study to understand why.”
5. “If increased stress and lack of sleep have resulted in noticeably lower energy levels for you, our study might provide helpful information.”

## Discussion

Gaining a deep understanding of patients’ perspectives in the medical field can offer valuable insights for healthcare providers. By understanding the different mind-sets that patients may have at the beginning of a discussion, healthcare professionals can adapt their approach to effectively meet the patient’s needs and address their concerns. Improved communication, patient satisfaction, and overall outcomes can be achieved through this approach.

Developing a tool which can categorize individuals based on their mind-set regarding specific topics has immense potential in healthcare settings. This tool can assist healthcare providers in efficiently evaluating the patient’s mind-set and adapting their interactions accordingly. For instance, when a patient is feeling fearful or anxious, the healthcare provider can adopt a compassionate and comforting approach during the conversation. Alternatively, when a patient approaches with a curious or open mind-set, the provider can prioritize offering educational information and fostering shared decision-making.

Understanding the mind-set of the patient during triage when they visit a clinic or hospital can be extremely advantageous. This information has the potential to be valuable in determining the order of patient care, taking into account their unique needs and preferences. Take, for instance, a patient who is feeling a sense of urgency or distress. In this case, it’s crucial to provide them with immediate attention. On the other hand, a patient who is feeling ambivalent may benefit from some extra support and education to help address their concerns.

Developing a range of mind-sets for different situations in the field of health, including non-health stages and experiences, has the potential to improve patient-centered care. By gaining insight into the various perspectives of patients, healthcare providers can offer interventions that are more individualized and customized. For example, individuals who feel empowered may find interventions that emphasize self-management and empowerment to be effective, whereas those who feel resigned may benefit from a more compassionate and supportive approach.

This exciting new opportunity in the field of medicine has the potential to refocus care on the patient, placing them at the heart of the healthcare experience. Recognizing and attending to the perspectives of patients can

help healthcare providers cultivate a stronger bond of trust, empathy, and teamwork. This approach, which prioritizes the needs of patients, has the potential to result in better patient outcomes, higher patient satisfaction, and an overall improvement in the quality of care provided.

## Conclusions

Listening to patients has become increasingly recognized as an important aspect of the medical profession. As a result, many medical schools have included lectures and training to teach this crucial skill. Understanding the significance of actively listening to patients is essential for new medical practitioners. This skill enables them to provide accurate diagnoses and effective treatments.

Furthermore, incorporating a computer-aided system that allows users to generate topic-specific questions, obtain answers, and interact with patients or colleagues in the medical field has the potential to greatly enhance their communication skills. By delving into a few of these studies on a daily basis, medical professionals can deepen their understanding of various medical conditions and the needs of their patients.

Thanks to AI technology, such as advanced language models, healthcare professionals now have the power to generate a wide range of questions and answers related to patient care and communication. Improving the connection between healthcare providers and patients can ultimately result in more positive treatment outcomes.

Young medical professionals can greatly benefit from a comprehensive education that delves into the intricacies of effectively communicating with patients who come from diverse backgrounds or have specific medical conditions. Enhancing their patient interaction skills can be greatly improved by developing questions and answers, as well as gaining practical experience with real or simulated patients.

Enhancing the conversation between medical professionals and patients is quite probable when healthcare providers undergo training in active listening and effective communication. By delving into the intricacies of patient needs, healthcare providers can improve treatment adherence and guarantee overall satisfaction with the healthcare experience.

By incorporating more effective patient communication practices, healthcare organizations can experience significant savings in terms of time, cost, and overall effectiveness. This can lead to improved efficiency and

better outcomes for both patients and providers. By minimizing miscommunications, refining treatment plans, and fostering patient confidence, healthcare providers can achieve better results and save precious time and resources.

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